<110> Chaudhary, Sarita
van Rooijen, Gijs
Moloney, Maurice
Singh, Surinder

<120> Flax Seed Specific Promoters

<130> 9369-151

<140> US 09/645,593

<141> 2000-08-25

<150> US 60/151,044

<151> 1999-08-27

<150> US 60/161,722

<151> 1999-10-27

<160> 25

<170> PatentIn Ver. 2.0

<210> 1

<211> 4305

<212> DNA

<213> Linum usitatissimum

<400> 1

ttcaaaaccc gattcccgag gcggccctat tgaagatatg ggggaagttc gacgagatcg 60 atgtcqqqtc qaqtqctatq qtqatqqtqc cqtttqqqqq qaqqatqaqc qaqataqcca 120 agactagcat tccgttccca cacagagttg ggaatttgta ccaaatccaa cacttgtcgt 180 attggagcga cgatagggac gcggaaaaac acatccgttg gatcagggag ttgtacgatg 240 atctcgagcc ttatgtgtcg aagaatccga ggtatgctta cgtgaactac agggatctcg 300 acatcgggat gaatggagga ggtgaagggg atgagaaggg tacttatggt gaggctaagg 360 tgtgggggga gaagtacttt ggggtcaact ttgatcggtt ggttcgggtg aagacgattg 420 ttgatcccaa taatgtgttt cgaaacgagc agagcattcc ctcaattcca actcggttat 480 aaggatcaat gatcaatgag aatttteett teeaatgtga ttacaagtte tattgggtea 540 gctttctcaa ctgctcctat tcatttagat taattcataa caactattaa tttaccagcc 600 ttttatccgg cccgttggcc gatttatttt cttaagtttt agatgaaatg aaaccgattt 660 agtttttatt gagatgagat taatcttaat ttgcttgaaa tttactcacg gttgatgtga 720 tatttggaat taactaaaat gataaatatc ggataaaaat aaaaatattt aaaataaata 780 acataaacat aagaacaata aaataaataa atttaatttt aatttatttc cttgttttct 840 ttctgtatca tacatctctt ctcttacttc ttaaaggctt ttcaattatc acttaattaa 900 atacaataga taaatcgtta attctataac attaacctat acacttgcac ggtgaacaat 960 caatatgata atataataat aatataataa ttcaattatt aatctacaat tttttaatta 1020 taaagtttat geggteagtt tetgeaaget eegageteet tgteategtt agtttetgeg 1080 gtctcaaggt ataacgactc ggagcgacga gccctttgct tccaatggac gggttgcatt 1140 tctgccgtcg ttgagctcga ttggcgtgtc atgctggagt cagagttcct acaaaaaaaa 1200 cctaaactag agggtgatta gggtgaaatt agggtgttgg cctgggttcc attgtccaaa 1260 gttttagtca acttaaaaac agacttaaat tttatgcttc aaaatagttt atctgttatt 1320 atattagcgt gtaattagtc ttgacaatgg ggccggacgg gtacggattc gggaccccga 1380 tccccgccca tagtgtaatg gctcaactgc caagtcagca ttggaccgaa attattggac 1440 acgaagtact aatgtgaaaa actttacatt tgttattttc tactttaata ctatgctatt 1500 ttcaaaattt gaactttaat actatgtttt tatatagttt agtatatctt aatttttatg 1560 caaattcatc taattgtatt aaactatttt cgatccgtag ctaattattt cgaaggcaag 1620 tcaaagtgtt attgtggact atgtgagcta atattgaacc tttatctctc ccaaccactc 1680 aagttaattg aaccaaactc gatcggttgg gtttcgagct atttcgagcc attgttgtta 1740 tatgcacgtg agatatcaag attgacccga acactttatt atgataatgt agaaaaagaa 1800 aacatattet aagaetacat geatgeaaag tgeaaceet geatggaaag etgeteaaca 1860 cgtggcatag actcccgcca cgtgtccatt ccacctcatc acctcaccc caccgttcac 1920 ctcttattat atcacaacaa tcaatcaatc ctactcctcc atactcgaac aaatccgacc 1980 aacttatacc aatattccca aacttgatta atttctcagc aatatggatc agacgcacca 2040 gacatacgcc ggaaccacgc agaacccgag ctatggcggc gggggcacaa tgtaccagca 2100

gcagcagccg aggtcttacc aggcggtgaa ggcggccact gcagccaccg cgggtggatc 2160 cctcatcgtt ctgtccggtc tcatccttac ggccaccgtc atttcactca tcatagccac 2220 contented greatettea georgettet tgtecegget etcateaceg tegggetett 2280 gatcaccggg tttcttgctt ccggtgggtt cggagtcgcc gccgtcaccg tcttgtcctg 2340 gatctatagg tatgtataag ctttggactt tagtattgtt ataaaataca taagctgatt 2400 tatgaacatg gatctcccaa caagagttat ttaaatgcat tctcggtctg actcgatcgg 2460 ttqqqttttq aqctactcgg tcacaatggt cgggtcggct ctggatctgt tatactaata 2520 tttggaagee tgaagtttea ttgttetgee ceaactteee actaeetttt gagggtgtta 2580 agaagccata caaactaatt atgaatccct cccaacaact cagaactcga gtcagtgggt 2640 tgtgacggtt ctctataaac atttcgaaaa tctttgttca atgaacgtag aaatgaccat 2700 gcttgatgat tgtgggtctt ataaggtacg tgaccggcgg gcacccggcg ggaggggatt 2760 cgctggacca ggctaggtcg aagctggccg gaaaggccag ggaggtgaag gacagggcgt 2820 cggagttcgc acagcagcat gtcacaggtg gtcaacagac ctcttaaaga gagtcctcta 2880 gttaaattgg tcttcgtttc tgtttcgtgg cggcttgtaa actctctttt aagtgtgctg 2940 ttttcctttt gtctcgtgtg ttgtaagtga aagtgtaatc gaagttccaa gttggagatg 3000 tttgtaacga tgatgttttc taataatcag agatattaaa agggttgcta atttagtatt 3060 gcgtctgatc tcggaccaaa ctcgcaagta aaattgcaga ggatgagttg tacagaacaa 3120 gegtgeattg ttetggaagt teateteett ggageegaee ttgttgettg eagtttegee 3180 aagtccacta gacaatgtta cgagttaagc ctctgtcaaa cagatcgctc tagcgtccca 3240 gaaaacacca gatttttcga aaaccatcgg ggatcaattt tcgattcaat tccgatcttg 3300 gaagtacttg aacagaagca tgatgctaaa agataataga aaatcgaagc ctagaaaagt 3360 tgtacagaaa gcaacaagtc aaaaatatag atcaacttca aaggttcaaa ttacatctta 3420 cagaccccaa aaaatgacag ttaacagaag tcgactaaac agaaaccagc cagcttcacc 3480 tggaatgaag gagetttgat caatecatee tagetteatt eeeetttgaa attgeagaea 3540 gageteteat eetgetaaag etggtggett attettaace etgeaateaa taageatgaa 3600 ctaacattgg acaccttcat cggcggattg ctcgaaaatc agtgagcgag ggatttacct 3660 gtgtgtgtag taacctctct ccttgtacat aaaatctgga aattccggca tcaactactg 3720 ccacctttct gcttaaggtg attttatcac caaggctgag cgtgattcct tgcgtcttgc 3780 tecgaateet gatgtateea etgagettte cateteette etteteeagg ettatgttea 3840 ccaatgcgtc ctcgccgaac acactcttgg cgtacaagtt cgcagccagg aatccacact 3900 ctccatcaag tgcagacctg caaaccccaa ataagaacac aaactccaaa gtcaacgatc 3960 aattctccgc cttttatgaa gaaaaggaaa cttctgggta cttacggtgc cgtcagacac 4020 ttcatatttg tagacttgat gatatggtcc aggaattcct tctcgttctg aattgttgtg 4080 ttaacagcaa cctgacagac agaaagatat cgcaaattta agatactggg atgactaggc 4140 acagagaaat gaaatctaat totagaagta aaaccttatt ttcccattca aattctgccc 4200 acatagteeg gaaegeagea teegageaag aageaggaga gatgtaatee atgatatega 4260 tgtgggtate gttgaggaeg acaaetgaae gtteeateae attgg 4305

<210> 2

<211> 109

<212> PRT

<213> Linum usitatissimum

<400> 2

Met Asp Gln Thr His Gln Thr Tyr Ala Gly Thr Thr Gln Asn Pro Ser

1 5 10 15

Tyr Gly Gly Gly Thr Met Tyr Gln Gln Gln Pro Arg Ser Tyr

20 25 30

Gln Ala Val Lys Ala Ala Thr Ala Ala Thr Ala Gly Gly Ser Leu Ile

35 40 45

Val Leu Ser Gly Leu Ile Leu Thr Ala Thr Val Ile Ser Leu Ile Ile

50 55 60

Ala Thr Pro Leu Leu Val Ile Phe Ser Pro Val Leu Val Pro Ala Leu

65 70 75 80

Ile Thr Val Gly Leu Leu Ile Thr Gly Phe Leu Ala Ser Gly Gly Phe

85 90 95

Gly Val Ala Ala Val Thr Val Leu Ser Trp Ile Tyr Arg

100 105

<210> 3

<211> 46

<212> PRT

<213> Linum usitatissimum

<400> 3

Tyr Val Thr Gly Gly His Pro Ala Gly Gly Asp Ser Leu Asp Gln Ala

1 5 10 15

Arg Ser Lys Leu Ala Gly Lys Ala Arg Glu Val Lys Asp Arg Ala Ser

20 25 3

Glu Phe Ala Gln Gln His Val Thr Gly Gly Gln Gln Thr Ser

35 40 45

<210> 4

<211> 3501

<212> DNA

<213> Linum usitatissimum

<400> 4

tctagacatt tgacataaac cgaattcaaa gaacacaaca ttgactaaca ccaaaaagaa 60 atagagtagt gaaatttgga agattaaaaa atagaaacaa actgattctt agaaagaaga 120 gatgattagg tgctttcagt tcggtctgtc aggaaatcga gatgttcact tatttacatt 180 qtcgattcat ctcccaattg tcctggttcc tttactgtcc gacgcttttt tgaatcccag 240 ttaattccca tcaagtcttc cttcagctgc gtagcactgc tagctccaac atggagcgtg 300 gagtctactc gttcatgggg catcgcaaag gtttgccttc atgttctgct accagccagc 360 gcccaccgcc tcttggttgt gtggacaatt gcggtgaagc gcgcaagttg acatcccata 420 gtctcgacac ttcaccatat ggatgtttaa aacgtatatc acgagtgcga tctacatgtc 480 ccatcacacc acatataaag caatagtttg ggagcttttc atatttgaaa cgggcattga 540 cgacttgccc tctcgataat ttaatctttt tttctcttca gctgattgtg tgcatccatt 600 cgggctcaga agcacatcaa agggatctct ccatcgtagt attgggtcgt gtcgtatgat 660 acgaagcagt cgatgaagtt tectaatgtg cgagetacag geteegcaaa gaaccegega 720 ggtagatcgt atgctagtac ccaaaaatca gtttgtcgta gcggaatcaa cactagagac 780 tcaccctaat gcatctcatg tgtgatgaac agtttatcat ttgtgagtct aggggtcatt 840 gtcgatgacc caatgcacat tgagcttatg atagaatttg aataggaagc gttttccacc 900 cagatcacga atagctaccc ctttttcggg cgccaaattt ccggcatcct atcttccacc 960 acaacttaaa gatgcgatcg gtaaggaact caccgaccac acacatcgaa taatcttcgg 1020

1.

tgaccggttc ctgttgatca agtccctcaa tttcctcaac ctagtcttca atcgccgcta 1080 gcgttatccc ccgcatatgg actttcatag cgcggagcgt agccggagac gacgagcaag 1140 aaggatgagc ggcggcagat tgcggctaaa gaaacgagct tcctgccttg ctctatggag 1200 gcagatttct gagttgatgg tgatggattt gtgatgtgga cacttttaat ttaagttgat 1260 tttttagcac ttcattcacg taattaaata aataatttcc agtattttat atttatttcc 1320 ttacgttatc taattttttg aaagattaaa actttgatat aggcaagatc atgacacgtc 1380 gaagttaagt gaatgagact cctaacaagg taataacaaa gcagttcata aaccgaatga 1440 ccttgatctt tactaagctt gagatcattg aacatataat taaatacgtt aatgaaagat 1500 aagaacttta atataaaaat cattcaaaac gagaaactga taacaaaaac aaagcaaacg 1560 qccaacaaaa taatagacgg tggaaggatg atgcagagcc atccaccctt ttttcccagt 1620 ttccttactg cttacttctc tatgcatatc acaagacgcc cttgaaactt gttagtcatg 1680 cagagecett actegecagg teacegeace aegtgttact etateaette teeteeettt 1740 cctttaaaga accaccacgc cacctccctc tcacaaacac tcataaaaaa accacctctt 1800 gcatttctcc caagttcaaa ttagttcaca gctaagcaag aactcaacaa caatggcgga 1860 tegtacaaca cagecacace aagtecaggt ceacacecag caceactate ceaceggegg 1920 ggctttcggc cgttatgaag gtggactcaa aggcggtcca catcaccagc aaggatcagg 1980 cageggeeca teagetteea aggtgttage agteatgace gegeteeca teggegggae 2040 cctccttgcc ttggccggga taaccttggc tgggacgatg atcgggctgg cgatcaccac 2100 cccgattttt gtcatctgca gccctgttct agtcccggcc gctctgctca tcgggtttgc 2160 cgtgagcgcg tttctggcct cggggatggc cgggctgaca gggctgacct cgctgtcgtg 2220 gtttgcgagg tatctgcagc aggctgggca gggagttgga gtgggggtgc cggatagttt 2280 cqaqcaqqcq aaqaqqcqca tqcaggatgc tqctgggtat atggggcaga agaccaagga 2340 agttgggcag gagatccaga ggaagtctca ggatgtgaaa gcatcagaca aataaggtga 2400 taataagggg ttttgggttc gtgtgtaaac tggtaaaatg gaaattctgg gttttactgt 2460 acttttgcat gtagtggaat gaatgagttc ttgttctctt ttgtctttta atcataaagt 2520 aagaagcagc atttcatgtt ctggttgaat attgtcaaga attcgcaaca aatttagcta 2580 aaccagttca atcttaccgg ttagacgact tcccagtaag aaacattcca ggtccatccc 2640 ggtataagag tetggaette tgaaacettt agaeettgga tttggaaaaa agatgaaace 2700 tttagaataa attacaacga tggcagattg tacaaaactg gagtcgagat catgtaaatt 2760 agcccataac taagaaccgg cgatgacaac aattactagg aatatggttg ttgggctggt 2820 cggcggctag cggtgatgat ttggaagaat cggggatcca gaatgtgaga accgaatcat 2880 cgacgaacat tacccggcga ggagcccatt tcaagcaact ttggaactcc tatatggctg 2940 ttccagcagg ccacctgctc aagaaagaaa gaagccatgt cagaaatcct tacgaaatct 3000 aactggatgc tgatatgaat ccgccaggtg tgcggagttc tttacaggca ggatctataa 3060 agaagaaaca tgttttgtat tggcattgtt gatgttccaa gcacgcagcg atctatctcc 3120 ggatcctaac aacaaaata cggattctgt aagaaacaag cgcagaaaac ttctgcaacg 3180
aaaccactcg tatatttggt tctgagttgg agaaagatga ccatactact gtatttggtt 3240
gaacttggat tggaaccgaa attttgagtt gaaaagcgag tgatcgtata taaatttcag 3300
attcagatta ggatatccta tgagagaagg tagagttacc tgatactaca tactgcccat 3360
caggggtaaa agttgcctcg atggttgtg ttggagatgg ttccaggcta aatccacaac 3420
gctgaacaaa ttaaaagatg aatggatcaa tcttcaaccc ttacttctgc atttatgagg 3480
attggctcaa ggctctctag a

<210> 5

<211> 180

<212> PRT

<213> Linum usitatissimum

<400> 5

Met Ala Asp Arg Thr Thr Gln Pro His Gln Val Gln Val His Thr Gln

1 5 10 15

His His Tyr Pro Thr Gly Gly Ala Phe Gly Arg Tyr Glu Gly Gly Leu
20 25 30

Lys Gly Gly Pro His His Gln Gln Gly Ser Gly Ser Gly Pro Ser Ala

35 40 45

Ser Lys Val Leu Ala Val Met Thr Ala Leu Pro Ile Gly Gly Thr Leu 50 55 60

Leu Ala Leu Ala Gly Ile Thr Leu Ala Gly Thr Met Ile Gly Leu Ala
65 70 75 80

Ile Thr Thr Pro Ile Phe Val Ile Cys Ser Pro Val Leu Val Pro Ala
85 90 95

Ala Leu Leu Ile Gly Phe Ala Val Ser Ala Phe Leu Ala Ser Gly Met
100 105 110

Ala Gly Leu Thr Gly Leu Thr Ser Leu Ser Trp Phe Ala Arg Tyr Leu
115 120 125

Gln Gln Ala Gly Gln Gly Val Gly Val Gly Val Pro Asp Ser Phe Glu 130 135 140

Thr Lys Glu Val Gly Gln Glu Ile Gln Arg Lys Ser Gln Asp Val Lys

165 170 175

Ala Ser Asp Lys

180

<210> 6

<211> 1676

<212> DNA

<213> Linum usitatissimum

<400> 6

tecactatgt aggreatate cateattta attitigge accatteaat tecatetige 60 ctttagggat gtgaatatga acggecaagg taagagaata aaaataatee aaattaaage 120 aagagaggee aagtaagata atecaaatgt acaettgtea tegeegaaat tagtaaaata 180 cgeggeatat tgtatteea cacattatta aaatacegta tatgtattgg etgeattige 240 atgaataata etaeegtgata geecaaaaga acceaegtgt ageecatgea aagttaacae 300 teaegaeeee atteeteagt etecaetata taaaeeeaee ateeeeaate ttaeeaaaee 360 caceaeaega eteaeaaee gaeteteaea eetaaagaa ecaateaeea eeaaaaaatg 420 geaaagetga tgageetage ageegtagea aegeagtee tetteetgat egtggtggae 480 geateegtee gaaceaeag agtetgeag eageagaeea aegeagtee ageagagee eggtggagge 540 aaggtggeag agteetgeag eageagaee eageaggeeg geeaeageea etaetaeae 660 cagggeegtg gaggaggega acagageeag taettegaae agetgttigt gaegaeetta 720 ageaaattgeg eaeeggggg eaceatgeea eggggaeettga ageegteeat eggeeaaatg 780

<210> 7

<211> 174

<212> PRT

<213> Linum usitatissimum

<400> 7

Met Ala Lys Leu Met Ser Leu Ala Ala Val Ala Thr Gln Phe Leu Phe

1 5 10 15

Leu Ile Val Val Asp Ala Ser Val Arg Thr Thr Val Ile Ile Asp Glu 20 25 30

Glu Thr Asn Gln Gly Arg Gly Gly Gly Lys Val Ala Gly Thr Ala Ala
35 40 45

Val Cys Glu Gln Gln Ile Gln Gln Arg Asp Phe Leu Arg Ser Cys Gln
50 55 60

Gln Phe Met Trp Glu Lys Val Gln Arg Gly Gly His Ser His Tyr Tyr

65 70 75 80

Asn Gln Gly Arg Gly Gly Glu Gln Ser Gln Tyr Phe Glu Gln Leu 85 90 95

Phe Val Thr Thr Leu Ser Asn Cys Ala Pro Arg Cys Thr Met Pro Gly
100 105 110

Asp Leu Lys Arg Ala Ile Gly Gln Met Arg Gln Glu Ile Gln Gln Gln
115 120 125

Gly Gln Gln Gln Gln Gln Gln Gln Gln Gln Arg Trp Ile Gln Gln
130 135 140

Ser Gln Cys Gln Phe Gln Gly Gln Gln Gln Ser Ala Trp Phe 165 170

<210> 8

<211> 4999

<212> DNA

<213> Linum usitatissimum

<220>

<221> misc_feature

<222> (4396)

<223> n is any nucleotide (atgc)

<220>

<221> misc_feature

<222> (4407)

<223> n is any nucleotide (atgc)

```
<220>
<221> misc_feature
<222> (4415)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4423)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4445)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4475)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4497)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4515)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4545)
<223> n is any nucleotide (atgc)
```

```
<220>
<221> misc_feature
<222> (4548)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4550)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4552)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4556)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4567)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4580)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4587)
<223> n is any nucleotide (atgc)
```

```
<220>
<221> misc_feature
<222> (4591)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4593)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4605)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4613)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4616)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4620)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4622)
<223> n is any nucleotide (atgc)
```

```
<220>
<221> misc_feature
<222> (4626)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4635)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4657)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4659)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4664)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4668)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4677)
<223> n is any nucleotide (atgc)
<220>
```

```
<221> misc_feature
<222> (4685)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4695)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4705)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4708)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4711)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4713)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4715)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4731)
<223> n is any nucleotide (atgc)
```

```
<220>
<221> misc_feature
<222> (4738)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4740)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4743)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4746)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4759)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4766)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4773)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4780)
<223> n is any nucleotide (atgc)
```

```
<220>
<221> misc_feature
<222> (4782)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4784)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4790)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4792)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4795)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4802)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4810)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
```

```
<222> (4813)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4820)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4822)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4830)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4839)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4843)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4845)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4847)
<223> n is any nucleotide (atgc)
<220>
```

```
<221> misc_feature
<222> (4851)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4854)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4858)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4865)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4880)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4882)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4885)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4887)
<223> n is any nucleotide (atgc)
```

```
<220>
<221> misc_feature
<222> (4891)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4893)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4895)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4901)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4906)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4927)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4931)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4933)
<223> n is any nucleotide (atgc)
```

```
<220>
<221> misc_feature
<222> (4937)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4942)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4945)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4949)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4951)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4954)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4958)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
```

```
<222> (4965)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4968)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4970)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4975)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4982)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4989)
<223> n is any nucleotide (atgc)
<220>
<221> misc_feature
<222> (4994)
<223> n is any nucleotide (atgc)
<400> 8
ctcaagcata cggacaaggg taaataacat agtcaccaga acataataaa caaaaagtgc 60
agaagcaaga taaaaaaatt agctatggac attcaggttc atattggaaa catcattatc 120
ctagtcttgt gaccatcctt cctcctgctc tagttgagag gccttgggac taacgagagg 180
tcagttggga tagcagatcc ttatcctgga ctagcctttc tggtgtttca gagtcttcgt 240
gccgccgtct acatctatct ccattaggtc tgaagatgac tcttcacacc aacgacgttt 300
```

aaggtctcta	tcctactcct	agcttgcaat	acctggcttg	caatacctgg	agcatcgtgc	360
acgatgattg	gatactgtgg	aggaggagtg	tttgctgatt	tagagetece	ggttgggtga	420
tttgacttcg	atttcagttt	aggcttgttg	aaatttttca	ggttccattg	tgaagccttt	480
agagcttgag	cttccttcca	tgttaatgcc	ttgatcgaat	tctcctagag	aaaagggaag	540
tcgatctctg	agtattgaaa	tcgaagtgca	cattttttt	caacgtgtcc	aatcaatcca	600
caaacaaagc	agaagacagg	taatctttca	tacttatact	gacaagtaat	agtcttaccg	660
tcatgcataa	taacgtctcg	ttccttcaag	aggggttttc	cgacatccat	aacgacccga	720
agcctcatga	aagcattagg	gaagaacttt	tggttcttct	tgtcatggcc	tttataggtg	780
tcagccgagc	tcgccaattc	ccgtccgact	ggctccgcaa	aatattcgaa	cggcaagtta	840
tggacttgca	accataactc	cacggtattg	agcaggacct	attgtgaaga	ctcatctcat	900
ggagcttcag	aatgtggttg	tcagcaaacc	aatgaccgaa	atccatcaca	tgacggacgt	960
ccagtgggtg	agcgaaacga	aacaggaagc	gcctatcttt	cagagtcgtg	agctccacac	1020
cggattccgg	caactacgtg	ttgggcaggc	ttcgccgtat	tagagatatg	ttgaggcaag	1080
acccatctgt	gccactcgta	caattacgag	agttgttttt	tttgtgattt	tcctaagttt	1140
ctcgttgatg	gtgagctcat	attctacatc	gtatggtctc	tcaacgtcgt	ttcctgtcat	1200
ctgatatccc	gtcatttgca	tccacgtgcg	ccgcctcccg	tgccaagtcc	ctaggtgtca	1260
tgcacgccaa	attggtggtg	gtgcgggctg	ccctgtgctt	cttaccgatg	ggtggaggtt	1320
gagtttgggg	gtctccgcgg	cgatggtagt	gggttgacgg	tttggtgtgg	gttgacggca	1380
ttgatcaatt	tacttcttgc	ttcaaattct	ttggcagaaa	acaattcatt	agattagaac	1440
tggaaaccag	agtgatgaga	cggattaagt	cagattccaa	cagagttaca	tctcttaaga	1500
aataatgtaa	cccctttaga	ctttatatat	ttgcaattaa	aaaaataatt	taacttttag	1560
actttatata	tagttttaat	aactaagttt	aaccactcta	ttatttatat	cgaaactatt	1620
tgtatgtctc	ccctctaaat	aaacttggta	ttgtgtttac	agaacctata	atcaaataat	1680
caatactcaa	ctgaagtttg	tgcagttaat	tgaagggatt	aacggccaaa	atgcactagt	1740
attatcaacc	gaatagattc	acactagatg	gccatttcca	tcaatatcat	cgccgttctt	1800
cttctgtcca	catatcccct	ctgaaacttg	agagacacct	gcacttcatt	gtccttatta	1860
cgtgttacaa	aatgaaaccc	atgcatccat	gcaaactgaa	gaatggcgca	agaacccttc	1920
ccctccattt	cttatgtggc	gaccatccat	ttcaccatct	cccgctataa	aacaccccca	1980
tcacttcacc	tagaacatca	tcactacttg	cttatccatc	caaaagatac	ccaccatggc	2040
tagatcatca	agccctttgc	ttctctcact	ctgcattttc	gccattctct	tccactcttc	2100
tctgggtagg	cagcaattcc	agcaggggaa	cgagtgccag	atcgacagga	tcgacgcatc	2160
cgagccggac	aaaaccatcc	aggcagaagc	tggcaccatc	gaggtatggg	accagaaccg	2220
ccagcaattc	cagtgcgctg	gtgttgccgt	tgtaaggcgc	accattgagc	ccaaaggtct	2280
tctcttgcct	ttctacagca	acacccctca	gctcatctac	atcgttcaag	gtataaatta	2340
aatcagttca	tacaatgata	accaccactt	cgaatgtatt	tatcaaatat	caatgatcga	2400

tgcacctgta tgtgttgtgt atattcaggt aggggagtta caggaatcat gttcccakga 2460 tgtccagaga cattcgagga atcccagcag caaggacaac agggccaaca gggtagttcc 2520 caagaccagc accagaagat ccgccgcttc cgtgaaggtg acgtcattgc cgtccctgcc 2580 ggtgtagccc actggtccta caacgatggc aacgaaccag tcatggccat tgttgtccat 2640 gacacttcca gccacctcaa ccaactggac aacaacccca gggtatataa gcattgccgt 2700 agttgctaat aaattgcaca caattggaac tctattttca gtatctaata actttttcct 2760 tttttggcag aacttctact tggcaggaaa cccgagagac gagttcgaac aatcgcagca 2820 aggaggcagg ctgagccgtg gggagagtga aggtggacga ggacgcaggg aacctcttca 2880 acctgcaaca acctcttctt geggaatega etecaagete ategeggagg egtteaatgt 2940 cqacqaqaac gtggcaagga ggctacagag cgagaacgac aacagaggcc agatcgtccg 3000 agtegaagge gagetegaea tegteagaee teegaeeagt ateeaggagg agteacagga 3060 gcagggaggt cgtggtggtg gccgctacta ctccaatgga gtggaggaga ccttctgctc 3120 catgagacta attgagaaca tcggcgatcc ttctcgggca gacattttca ctccagaagc 3180 eggeegegtt agateeetea acageeacaa ecteeeegte etgeaatgga teeagettag 3240 cgccgagaga ggcgttctct acaatgtata gatctcactc acgcaccaac tctaaattga 3300 atccctaatt atttaattca ccgatatctg accgaccggt ttgaattttg taggaagcga 3360 teaggetgee geactggaae ateaacgeae acageatagt gtacgegate agaggacaag 3420 ccagagtcca gatcgtgaac gaggaaggga attcggtgtt cgatggagtg ctgcaggaag 3480 gacaggtggt gacggtgccg cagaacttcg cggtggtaaa gagatcccag agcgagaggt 3540 ttgagtgggt ggcgttcaag accaacgaca acgcgatggt gaactcgcta gccgggagga 3600 categgeagt aagggegate eeegeggatg taetggetaa egeetggagg gtgtegeegg 3660 aggaggcgag gagggtgaag ttcaacaggc aggagactca cttggctagc accaggggcc 3720 agtccaggtc gcccgggagg ttgaatgtcg tcaaggaggt gatcaacttg cttatgtaaa 3780 atgtgacggt gaaataataa cggtaaaata tatgtaataa taataataat aaagccacaa 3840 agtgagaatg aggggaaggg gaaatgtgta atgagccagt agccggtggt gctaattttg 3900 tatogtattg toaataaato atgaattttg tggtttttat gtgttttttt aaatcatgaa 3960 ttttaaattt tataaaataa tctccaatcg gaagaacaac attccatatc catggatgtt 4020 tetttaceca aatetagtte ttgagaggat gaageateae egaacagtte tgeaactate 4080 cctcaaaagc tttaaaatga acaacaagga acagagcaac gttccaaaga tcccaaacga 4140 aacatattat ctatactaat actatattat taattactac tgcccggaat cacaatccct 4200 gaatgattee tattaaetae aageettgtt ggeggeggag aagtgategg egeggegaga 4260 aqcaqcqqac tcqqaqacqa qqccttqqat qaqcaqaqtc tttacctqcc aqqqqqtqaa 4320 ggggaagage ggeettetgg agtaggagtt cageaagegg eggtteettg geggagtaag 4380 cggacgtaag ggtggntgtc gacgtcntcg tttcnggagg cgnattcatg aagggttaaa 4440 gtcanatctg tagctctcga gtgctcaggg agccnaaaga cgttgggaaa ccgtcgncgt 4500 ttggggcatc agtcngcgg gcacgcttcc ctcctgctgc tccanaancn angtanattt 4560
aaaaganatg ggaaattaan taatggnaat nannaggagg attgnaacgg tcnganccgn 4620
angaanagtt tttannggtt taaatactgg gggagtngna gccngccnct ggttccngtg 4680
tagangaaac caagnnccgg gaggnttnca nnngnnaggg agaaaaagga nncatttnan 4740
nangcngagg gacatgaanc ggtacngagc tgnggttcan nnancggcgn nnggnagtcc 4800
cnngggaccn ggntggggtn anaagggaan ggaacattng gtngnangga naanaccntt 4860
ttacnattgc ctttgcaggn nngtntnggc ncntncgggt nacatnccgc tgcatgggct 4920
ttggggngcc nanaggnagc cncangggna nnengcencc ttgtncangn cgctnaagtt 4980
cnattgtana tggncgttg

<210> 9

<211> 96

<212> PRT

<213> Linum usitatissimum

<400> 9

Met Ala Arg Ser Ser Pro Leu Leu Leu Ser Leu Cys Ile Phe Ala

1 5 10 15

Ile Leu Phe His Ser Ser Leu Gly Arg Gln Gln Phe Gln Gln Gly Asn
20 25 30

Glu Cys Gln Ile Asp Arg Ile Asp Ala Ser Glu Pro Asp Lys Thr Ile
35 40 45

Gln Ala Glu Ala Gly Glu Val Trp Asp Gln Asn Arg Gln Gln Phe Gln
50 55 60

Cys Ala Gly Val Ala Val Val Arg Arg Thr Ile Glu Pro Lys Gly Leu
65 70 75 80

Leu Leu Pro Phe Tyr Ser Asn Thr Pro Gln Leu Ile Tyr Ile Val Gln
85 90 95

<210> 10 <211> 85 <212> PRT <213> Linum usitatissimum <220> <221> SITE <222> (59) <223> n is any amino acid <220> <221> SITE <222> (62) <223> n is any amino acid <220> <221> SITE <222> (78) <223> n is any amino acid <220> <221> SITE <222> (82) <223> n is any amino acid <400> 10 Gly Arg Gly Val Thr Gly Ile Met Phe Pro Xaa Cys Pro Glu Thr Phe 1 5 10 15 Glu Glu Ser Gln Gln Gln Gln Gln Gln Gln Gln Gln Ser Ser Gln 20 25 30 Asp Gln His Gln Lys Ile Arg Arg Phe Arg Glu Gly Asp Val Ile Ala 40 35 Val Pro Ala Gly Val Ala His Trp Ser Tyr Asn Asp Gly Asn Glu Pro 50 55 60 Val Met Ala Ile Val Val His Asp Thr Ser Ser His Leu Asn Gln Leu 65 70 75 80

Asp Asn Asn Pro Arg

<211> 165 <212> PRT <213> Linum usitatissimum <400> 11 Asn Phe Tyr Leu Ala Gly Asn Pro Arg Asp Glu Phe Glu Gln Ser Gln Gln Gly Gly Arg Leu Ser Arg Gly Glu Ser Glu Gly Gly Arg Gly Arg Arg Glu Pro Leu Gln Pro Ala Thr Thr Ser Ser Cys Gly Ile Asp Ser Lys Leu Ile Ala Glu Ala Phe Asn Val Asp Glu Asn Val Ala Arg Arg Leu Gln Ser Glu Asn Asp Asn Arg Gly Gln Ile Val Arg Val Glu Gly Glu Leu Asp Ile Val Arg Pro Pro Thr Ser Ile Gln Glu Glu Ser Gln Glu Gln Gly Gly Arg Gly Gly Arg Tyr Tyr Ser Asn Gly Val Glu Glu Thr Phe Cys Ser Met Arg Leu Ile Glu Asn Ile Gly Asp Pro Ser Arg Ala Asp Ile Phe Thr Pro Glu Ala Gly Arg Val Arg Ser Leu Asn

<210> 11

Gly Val Leu Tyr Asn

165

<210> 12

<211> 141

<212> PRT

<213> Linum usitatissimum

<400> 12

Glu Ala Ile Arg Leu Pro His Trp Asn Ile Asn Ala His Ser Ile Val

1 5 10 15

Tyr Ala Ile Arg Gly Gln Ala Arg Val Gln Ile Val Asn Glu Glu Gly
20 25 30

Asn Ser Val Phe Asp Gly Val Leu Gln Glu Gly Gln Val Val Thr Val
35 40 45

Pro Gln Asn Phe Ala Val Val Lys Arg Ser Gln Ser Glu Arg Phe Glu
50 55 60

Trp Val Ala Phe Lys Thr Asn Asp Asn Ala Met Val Asn Ser Leu Ala 65 70 75 80

Gly Arg Thr Ser Ala Val Arg Ala Ile Pro Ala Asp Val Leu Ala Asn
85 90 95

Ala Trp Arg Val Ser Pro Glu Glu Ala Arg Arg Val Lys Phe Asn Arg

100 105 110

Gln Glu Thr His Leu Ala Ser Thr Arg Gly Gln Ser Arg Ser Pro Gly

115 120 125

Arg Leu Asn Val Val Lys Glu Val Ile Asn Leu Leu Met
130 135 140

<210> 13

<211> 11

<212> PRT

<213> Linum usitatissimum

<400> 13

Gln Gln Gln Gln Gln Gln Gln Gln Gln

1 5 10

<210> 14

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 14

tccactatgt aggtcata

18

<210> 15

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 15	
ctttaaggtg tgagagtc	18
<210> 16	
<211> 15	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Description of Artificial Sequence: Primer	
<400> 16	
aggggtgatc gatta	15
<210> 17	
<211> 18	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Description of Artificial Sequence: Primer	
<400> 17	
gatagaaccc acacgagc	18
<210> 18	
<211> 29	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Description of Artificial Sequence: Primer	
<400> 18	

tatctagact caagcatacg gacaagggt

29

<210> 19 <211> 6 <212> DNA <213> Artificial Sequence <220> <223> Description of Artificial Sequence: XbaI site <400> 19 6 tctaga <210> 20 <211> 21 <212> DNA <213> Artificial Sequence <220> <223> Description of Artificial Sequence: Primer <400> 20 21 ggttatcatt gtatgaactg a <210> 21 <211> 6 <212> DNA <213> Artificial Sequence <220> <223> Description of Artificial Sequence: NcoI site <400> 21 6 ccatgg

<210> 22

• t v

• • •

<212> DNA

```
<211> 32
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence: Primer
<400> 22
                                                                   32
gcaagcttaa tgtgacggtg aaataataac gg
<210> 23
<211> 6
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence: HindIII Site
<400> 23
                                                                   6
aagctt
<210> 24
<211> 29
<212> DNA
<213> Artificial Sequence
<220>
<223> Description of Artificial Sequence: Primer
<400> 24
                                                                   29
taggtacctg gcaggtaaag actctgctc
<210> 25
<211> 6
```

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: KpnI Site

<400> 25

ggtacc

6